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| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.         | CONFIRMATION NO. |
|--|-------------|----------------------|-----------------------------|------------------|
| 10/796,290   | 03/10/2004  | Kotaro Nakamura      | 044499-0207                 | 9375             |
| 22428  | 7590        | 09/09/2005           |                             |                  |
| FOLEY AND LARDNER<br>SUITE 500<br>3000 K STREET NW<br>WASHINGTON, DC 20007 |             |                      | EXAMINER<br>CUEVAS, PEDRO J |                  |
|  |             |                      | ART UNIT                    | PAPER NUMBER     |
|  |             |                      | 2834                        |                  |

DATE MAILED: 09/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/796,290

Applicant(s)

NAKAMURA ET AL.

Examiner

Pedro J. Cuevas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 11 is/are rejected.
- 7) ☒ Claim(s) 5-10 and 12-14 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 8/6, 9/22, 12/23.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 2, 4, and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S.

Patent No. 6,282,104 B1 to Kern.

Kern clearly teaches the construction of DC injection and even harmonics control system comprising:

an approximate function storing part (36) that stores an approximate function related to a maximum power point corresponding the output level of the power generator of characteristics of the output power and the operating voltage and arranged to preliminarily store approximate functions corresponding to types of the power generator.; and

a control part (40) that calculates an operating voltage value corresponding to the present output power on the basis the approximate function as stored in the approximate function storing part and that sets this operating voltage value as an operating voltage value of the power converter in order to make the power point related to output power correspondence with the output level of the power generator follow up with the maximum power point;

said control part including:

a voltage calculating part (24) that calculates an value operating voltage value corresponding to the present output power of the power generator on the basis of the approximate function;

a voltage value setting part (32) that sets the operating voltage value as calculated by the voltage value calculating part as an operating voltage value of the power converter, and

a judging part (38) that calculates an operating voltage value corresponding to the present output power in the voltage value calculating part upon setting the operating voltage value in the voltage value setting part and that judges whether an absolute value of a difference between the calculated operating voltage value and the present operating voltage value is within a specified threshold or not;

wherein:

when it is judged by the judging part that the absolute value of the difference between the operating voltage values within the specified threshold, recognized that the power point related to the output power that corresponds to the output level of the power generator has reached proximate of the maximum power point; and

the control part is arranged in that, when it is judged by the judging part that the absolute value of the difference between the operating voltage values is not within the specified threshold, the operating voltage value is calculated in the voltage value calculating part, the calculated operating

voltage value is set in the voltage value setting part, and operations of the voltage value calculating part, the voltage value setting part and the judging part are continued until the absolute value of the difference between the operating voltage values falls within the specified threshold in the judging part

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,282,104 B1 to Kern in view of U.S. Patent No. 5,869,956 A to Nagao et al.

Kern discloses the construction of DC injection and even harmonics control system as disclosed above.

However, it fails to disclose the control part being arranged in that the operating voltage value of the power converter set to make the power point related to the output power of the power generator reach the maximum power point utilizing a hill-climbing method for maximum power follow-up control when it has been recognized that the power point related to the output power that corresponds the output level the power generator has reached proximate of the maximum power point.

Nagao et al. teach the construction of a solar power generation apparatus and power control device comprising:

a hill-climbing method making the power point related to the output power of the power generator reach the maximum power point for maximum power follow-up control when it has been recognized that the power point related to the output power that corresponds the output level the power generator has reached proximate of the maximum power point for the purpose of allowing maximum power point tracking (MPPT) control performed under ordinary circumstances, in order to extract maximum power from a solar cell (Abstract).

It would have been obvious to one skilled in the art at the time the invention was made to use the hill-climbing method disclosed by Nagao et al. on the DC injection and even harmonics control system disclosed by Kern for the purpose of allowing maximum power point tracking (MPPT) control performed under ordinary circumstances, in order to extract maximum power from a source.

***Allowable Subject Matter***

5. Claims 5-10 and 12-14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter.

The prior art of record, taken alone or in combination, does not teaches the construction of a power follow up control apparatus as described on:

dependent claim 5, comprising:

a first approximate function creating part that detects maximum power point for each output level of the power generator and that creates the approximate function on the basis of at least two maximum power points;

dependent claim 8, comprising:

a second approximate function creating part that:

separates, by dividing the output power into a plurality of level regions and by sequentially detecting power points, the detected plurality of power points into respective level regions;

calculates average values of the plurality of power points separated into respective level regions for setting the average values of each of the level regions as maximum power points; and

creates the approximate function on the basis of the maximum power points for each of the level regions;

dependent claim 12, comprising:

a first approximate function correcting part that detects a maximum power point for each output level of the power generator by using a hill-climbing method for maximum power follow-up control and that corrects the approximate functions as stored to correspond to each type of the power generator on the basis of the detected maximum power point;

dependent claim 13, comprising:

a second approximate function correcting part that detects a maximum power point each output level of the power generator by using hill-climbing method for maximum power follow-up control when it has been recognized that the power point related to the output power that corresponds to the output level of the power generator has reached proximate of the maximum power point , and

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that corrects the approximate functions as being stored in the approximate function storing part on the basis of the detected maximum power points; and dependent claim 14, comprising:

a third approximate function correcting part that executes follow-up operations to the maximum power point by using a hill-climbing method for maximum power follow-up control when it has been recognized that the power point related to the output power that corresponds to the output level of the power generator has reached proximate of the maximum power point, and that corrects only an intercept of the approximate function without changing its slope on the basis of the power point as detected by the follow-up operation.

### ***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pedro J. Cuevas whose telephone number is (571) 272-2021. The examiner can normally be reached on M-F from 8:30 - 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Darren Schuberg can be reached on (571) 272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.




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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Pedro J. Cuevas  
September 5, 2005



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